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a report on the Polish metallurgical industry.

The report contains information on the Polish import of iron ores from various countries for the years 1953, 1957, and 1958; total iron ore imports for 1937 and 1949; quantity of iron ore imports planned for 1960; number and location of iron ore mines in Poland, number of Polish mines under construction at present, and those planned for the future; iron ore production in Poland for 1957, and plans for 1960 and 1965.

the Polish import of iron ore cannot be eliminated; and that as iron ore is mainly delivered by the USSR (and in the near future the China import will grow perhaps even more rapidly), the part which these two countries play in the Polish foreign trade balance on the import side will grow proportionally.

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It seems without a shadow of doubt that the metallurgy of steel alongside with metallurgy of non-ferrous metals can be considered for many reasons as the key problem of the Poland's economic, political and strategical situation. Economic- because upon it depends mainly machine industry, and it considered the bottleneck of machine industry already several times in the contemporary Poland's economic history. Political - because this only branch depends wholly upon the deliveries of iron ore from the Soviet Union. Strategically - firstly because the deliveries are effected mostly through the bridge on the San river which if destroyed stops the whole heavy industry of Poland, secondly because in its turn upon the metallurgy of steel and iron depends the whole of defense industry.

Therefore this problem of central importance deserves to be brought into light from the different points of view. Only the analysis from different angles such as :

Metallurgy of steel and iron and its raw material basis

Metallurgy of steel and iron and the foreign trade

Metallurgy of steel and iron and its organizational level

Metallurgy of steel and iron and the labor productivity

Metallurgy of steel and iron and its technique

Metallurgy of steel and iron and its separate production units (plants) can put more light on the subject and bring us nearer to more or less economically justified conclusions.

On this structure the present paper will be based.

Polish metallurgy of steel and iron employs (the iron ore extraction including) 132.300 employers (workers and salaried) which represents 4,5% of the totally employed labor force in 1957 (in industry). Its production, taken in its value represents 6,6% of the globally taken value of the

industrial production (global value shall not be confused here with the net value which will be evaluated further)

It can be said , not without hesitation, that polish metallurgy enjoys partly favourable conditions for its existence and even developments.

Iron ore resources are rather scarce and its Fe contents low, but on the other hand - coal is found in a sufficient quantity, and other ingredients for smelting- accessible.

The local iron ore resources are evaluated at about 500 million tons. Its Fe contents is about 30%. Moreover its location, which is extremely unfavourable, results in a low productivity in the iron ore extraction, which increases the production costs of iron ore extracted at home.

The Poland's iron ore extraction covers only about 14,5% of the local demand. The external supplies amounted in 1957 about 5,9 metric tons, mostly from Russia (4 million tons).

The metallurgy of steel and iron covers the lions share of the local demand of rolled material from the ordinary and special steels. Import is effected only in the domain of some assortments of rolled iron such as rods, rolled iron, special steel rolled iron. The total import of rolled steel amounted in 1957 up to 200 thousand metric tons, which equals about 5,2% of the local demand. At the same time a significant part of the home production, namely 559 thousand metric tons of rolled iron (in 1957) is exported. This applies mainly to iron sheets, thick and thin.

In the Poland's metallurgy of steel and iron 25 blast furnaces are at work. Their capacity attains 12 450 m³. 88 open hearts and 15 electric furnaces (ovens working in the steel shops within the machine and mechanical mills are excluded from the account here.. 56 section mills are in work. The technical levels is very uneven (all these problems will be treated more in details elsewhere, this given as an introduction).

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The part of property which has been constructed after the war possesses machines and appliances which roughly correspond with the average level of Western Europe. At the same time the big part of existing production stock is employed already 30-50 years. From the total number of 25 blast furnaces, 6 has been constructed after the war ; its part in the total country production of iron amounts to 48,5% (the detailed data will be given further). From the total number of 88 open hearts which have been working in the Polish metallurgy in 1957 - 21 have been constructed after the war. From the total volume of the open heart ovens, 31% is installed in the steel mills constructed 50-60 years ago, 22% in the steel mill constructed 30-50 years ago, 10% in the steel mills constructed 10-30 years ago and 37% in the steel mills constructed ~~in the~~ less than 10 years ago. The part which open hearts constructed after the war represent in the total production of steel amounts to about 35% in 1957. In the total number of 56 section mills (rolling aggregates) existing in the Polish metallurgy of steel and iron, only 15 have been constructed after the war. From this very total number of 56 section mills, the aggregates working over 50 years represent 30%, from 30-50 years, 28 percent ,from ten to thirty years - 14 % and below 10 years only 28 %. The bloomings are comparatively modern, but the rest of plants are obsolete.

In 1957 particularly rapid rate of development was assured for the following deficit products of metallurgy (in comparison with 1956, where metallurgy played a role of a serious bottleneck): thin sheets 33% more than a year before thick sheets 27%, special steel products 10% more. The special steel were however in deficit still, and this deficit was partly covered in 1957 with an import of 12 thousand metric tons which amounted to nearly 3,5% of total home demand.

Total investments in metallurgy of iron amounted in 1957 to 1.800 million z lotys and were lower then in previous years . 55% of these funds have been located in the Lenin's (Nowa Huta) combine and the special steel mill "Warszawa" in Warsaw. Its effect can be part ly measured in the coke oven battery started in 1957 at Lenin mills (started in the meaning of production?) steel ~~mill~~^{foundry} production in the Warszawa mill (which is the first working shop in these mills), the and the roasting plant with two conveyors in the mill Bierut in Czeszowa. The rest of construction was continued in the Lenin works where following construction was under way, partly finished in 1958 :

Cold strip mill

Blast furnace of the 1386 m³ capacity

two open heart shops, 370 metric tons each

In the Warszawa works:

steel mill, production of which would attain, after its completion, about 300 thousand metric tons, foundry, press shop and drawing aggregates shop, and the construction of blooming was started, Blooming is expected, according to plans, to possess rolling cylinders of diameter 850 mm and production capacity 500-600 tons.

Location: The total rated ingot capacity of Poland for the year 1957 is 5,9 million net tons which is produced as follows

5,5 million net tons open heart process

330.000 net tons electric furnace process

70.000 net tons two obsolete Bessemer process plants.

Excluding the Lenin works, 88% of this is produced in the Upper Silesia area.

The steel mills are located in the Upper Silesia area which is a strip about 50 kilometers long and 20 kilometers wide, between the cities of Dabrowa Gornicza and Gliwice. The industrial statistics of this area are:

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Coal mining - 75 mines producing 100 million net tons of coal annually

Iron ore production- 1,9 million net tons per year

Steel production- 4,2 million net ingot tons per year

Zinc production- 175,000 net tons per year

Electric power- 145 billion kilowatt hours

Long range expansion comprehends the following increases in capacity

1960 - 6.6 million net tons

1970-1975 11 million net tons annual ingot capacity

It is interesting to note that the Upper Silesia area which in 1938 produced ~~only~~ 88% of the industry capacity, will produce only 50% at the completion of the 1970-1975 program.

The industry, to support its pig iron capacity, is mining 1,9 million net tons of Polish ore, as has been said before. The exact ingredients are .355 Phos and 32 % Fe. The imported Russian ore contains .04 Phos and 52% Fe.

The open heart facilities average hot metal charge of the industry is 60/70% This high average is made possible by charging an average of 60% hot metal in the stationary open heart furnaces, and up to 80% in the tilting furnaces. In the new plants and in the plants which had undergone considerable modernization, approximately 1/3 of the open heart capacity will be produced in tilting furnaces.

Of the 330,000 tons of electric furnace capacity, 5% is 18-8 stainless, 3% straight chromium stainless grades, and the balance electric furnace alloy high silicon grades and open heart carbon steel grades. Approximately 7% of the industry's capacity is electric furnace steel which will be maintained through the expansion program, primarily by the installation of the new special products plant at Warsaw which will increase the electric furnace capacity from 330,000 tons to 462,000 net ingot tons.

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Imported iron ore

Imports of iron ore to Poland raised in natural value about sevenfold since 1937. What is however striking and what throws a bright light upon two problems so intimately connected with the Polish metallurgy is the problem of correlation between the production of steel and import of iron ore now in the future as well as a problem of the percentage of special ores in the total import of metal ores. The questions which have to be posed and answered here are: Does the dependency from Russia grow or diminishes with the growth of metallurgy? Does the growth of metallurgy imply only the quantitative or also qualitative growth?

Let us examine the figures .

In 1937 the total import of the iron and manganese ore equaled about 670 thousands tons! In 1955 it amounted to 4742 tons.

The percentage of the manganese ore in the total amounted in 1937 to 12,3%, in 1955 - about 7%.

In the post-war years, correlated on the other hand with the outlined planned future of metallurgy the data are as follows:

In 1949 import of ore (iron ore only) amounted to 1,6 million tons.

In 1957 it amounted to 5,99 million tons. In 1960 it is expected that it will amount to 7,4 million tons and in 1965 to about 11 million tons.

The proportion of the imported iron ore to one ton of steel produced in Poland grows respectively from 690 to 1130, 1160 and 1250 ~~xxxx~~ kilos. The percentage of amount of manganese ore in the total grows in the postwar years from 3,3 % in 1949 to 6,8% in 1957 and (foreseen) 9,5% in 1965.

Furthermore, the composition of imported ore looks as follows:

Part of the principal import in the total input in metallurgy of iron and steel in Poland	1953		1955		1955		1955		1955		1955	
	ore in thousand tons	Part of Fe in thousand tons	Average Fe (%)	%% part of particula ore in total ore in	%% part of iron & steel in total input (particular ores respectively)	Total ore in thousand tons	Content of Fe in thousand tons	Average % of Fe	%% part of particu ore in total ore input	%% part of iron&steel in total input (particular ores respectively)		
Polish ores	670,3	235,4	35,2	15,0	10,6	1.122,2	352,4	31,3	16,6	11,5		
Soviet ores	2.072,0	1044,0	50,5	46,2	47,5	3.065,4	1449,6	47,2	45,3	47,5		
<div></div> ores	800,6	484,2	60,4	17,8	21,5 21,5	1.043,5	606,9	58,3	15,4	19,9		
Other ores	211,2	111,7	52,8	4,7	5,0	217,8	107,7	49,6	3,2	3,5		
Rest of input	729,9	340,6	46,7	16,3	15,4	1.319,2	538,2	40,8	19,5	17,6		
Total iron&steel containing input	4,484,0	2.215,9	49,5	100	100	6.768,0	3.054,8	45,1	100	100		

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In 1957 , 5,9 mil ion tons were imported. more than 4 m tons came from the Soviet Union - fro the Krivoi Rog area - 200,000 tons from China and 100,000 tons from Bulgaria. [REDACTED]

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[REDACTED] The Russian ore has to be transported some 700 miles, about 25 cent is waterborne to the Polish frontier, where it is taken on by rail and the remainder goes all the way by rail. Although transactions between Poland and other com unist countries may not all figure in the published trade figures, the effect of ore imports on the general import picture can be clearly seen. In 1956 for example, Poland imported metal ores and concentrates worth close on 80 million US \$. The figure for 1957 was over 112 million US \$.

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Before we tempt to reply extensively to the question on growing and diminishing Poland's dependency on Russian imports (and credits) we have to investigate more closely the possibilities of Polish ore mines now and in the future, districtwise.

This might complete the picture of iron ore mining (correlation between: growing steel production and growing ore demand, growing iron ore import and growing special ore import, growing iron ore import and growing Fe content countrywise, ~~xxxxxxx~~ calculated from above)

(close examination of local possibilities follows before end of this chapter

The last problem which makes analysis in this chapter complete is home production of iron ore and its possibilities. It may be perhaps more useful to present this problem districtwise,

DISTRICT	No of mines			
	Producing	Under construct.	Planned	
Czestochowa	10	5	3	
Kielce-Radom	4	2	2	
Leczyca	-	3	3	
Kowary	1	-	-	
Karpaty	1			
	Analysis	RESERVES		
	FE	proven	possible	potential
Czestochowa	32%	62 MM	42 MM	120 MM
Kielce-Radom	29%	16 "	19 "	84 "
Leczyca	18-28%	38 "		
Kowary	40%	2 "		
	PRODUCTION			
	1957	1960		1965
Czestochowa	1,500,000	2,200,000		2,700,000
Kielce-Radom	230,000	300,000		500,000
Leczyca	-	800,000		1,600,000
Kowary	70,000	-		-
	1,800,000	3,300,000		4,900,000

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As we see, the total production of steel grows in the time-period 1958-65 about 63%, the total production of iron ore grows in the same period from 2.300.000 to about 4.900.000 i.e. 110% (or totally 210%). Iron ore used per ton of steel grows however also as the development is going to take place mostly in the Leczyca District which ore contains the smallest percentage of Fe .

To contribute to the problem of productivity and efficiency analysis of polish iron ore resources we can calculate the following coefficients:

We establish here the economic calculus reflecting Firstly the cost of extraction in zlotys per one dollar, and secondly the cost of extraction in zlotys per one dollar considering the construction of new mines in the forthcoming period. We give the comparison with other minerals:

	XXXXXX Coal	Km km iron ore	Copper ore	Zinc ore	Sulphur	Phosphor	Brown coal
1	cokefiabile energy(flame) 12,5 17,8	41,5	87	40	25	100	11
2	cokef. flame 39,3 45	102,8	198	48	91,4	82	60

We may now recapitulate the whole problem on the basis of datas which have been either extrapolated or given.

1. Import of iron ore cannot be eliminated and with development of production of steel following regularities will be observed:
 - a. As iron ore is mainly delivered by the USSR and in near future the China import will grow perhaps even more rapidly, the part of

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these two countries in foreign trade balance on the import side will grow proportionally.

b. As the home production of iron ore is going to grow mainly on the basis of iron ore deposits of low efficiency, the home production cost of steel will grow. This may reflect in the prices of steel and in its turn- in the lower efficiency of machine export and construction. Further effects may be less calculable but even more significant- with the ratio of machine-export efficiency going downward, some dumping ideas which still haunt greatly economic officials in both Commission for Planning and the Ministry of Foreign Trade can be then undertaken, with the justification that comparative efficiency with traditional polish export of coal and some agricultural products falls nonetheless and therefore the problem which comes into life is either dumping or abandon. If dumping visa (which is now granted only in cases of export of complete enterprises considered as pioneer export) be widely applied, the next problem is-where to dump ? It seems that in this case the comeback to strictly political export-import (namely so-called neutral underdeveloped countries may be marked)

2.c. Some switches in specialization may take place with the change of production factors in machine production. As the polish machine productivity of labor does not grow quicker than in other bloc countries and as the cost of materials can grow quicker, some types especially of heavy and strategically important (highly capital intensive) machinery may be switched in the coordination plans from Poland to other countries of the bloc

2. Construction of metallurgy on such a vast scale was an economic failure. But it can be classified as an economic failure which will hang upon the whole of the Polish industry alongside with its development

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as it belongs to mistakes which are ~~not~~ neither halted not thwarted but developed. A vicious circle is therefore created.

3. The former centralization of this kind of industry in Silesia and partly in Leczyca regions, with an easy access to infrastructure of railway and labor, and the foreseen ~~partly~~ switch to other regions may create serious communication and labor peniury problems. It can be also foreseen that a lack of skilled labour, particularly needed to production of special steel in Warsaw, will be marked.

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